

O. OHLSSON.  
 LINER FOR CENTRIFUGAL LIQUID SEPARATORS.  
 APPLICATION FILED AUG. 19, 1905.

993,791.

Patented May 30, 1911.

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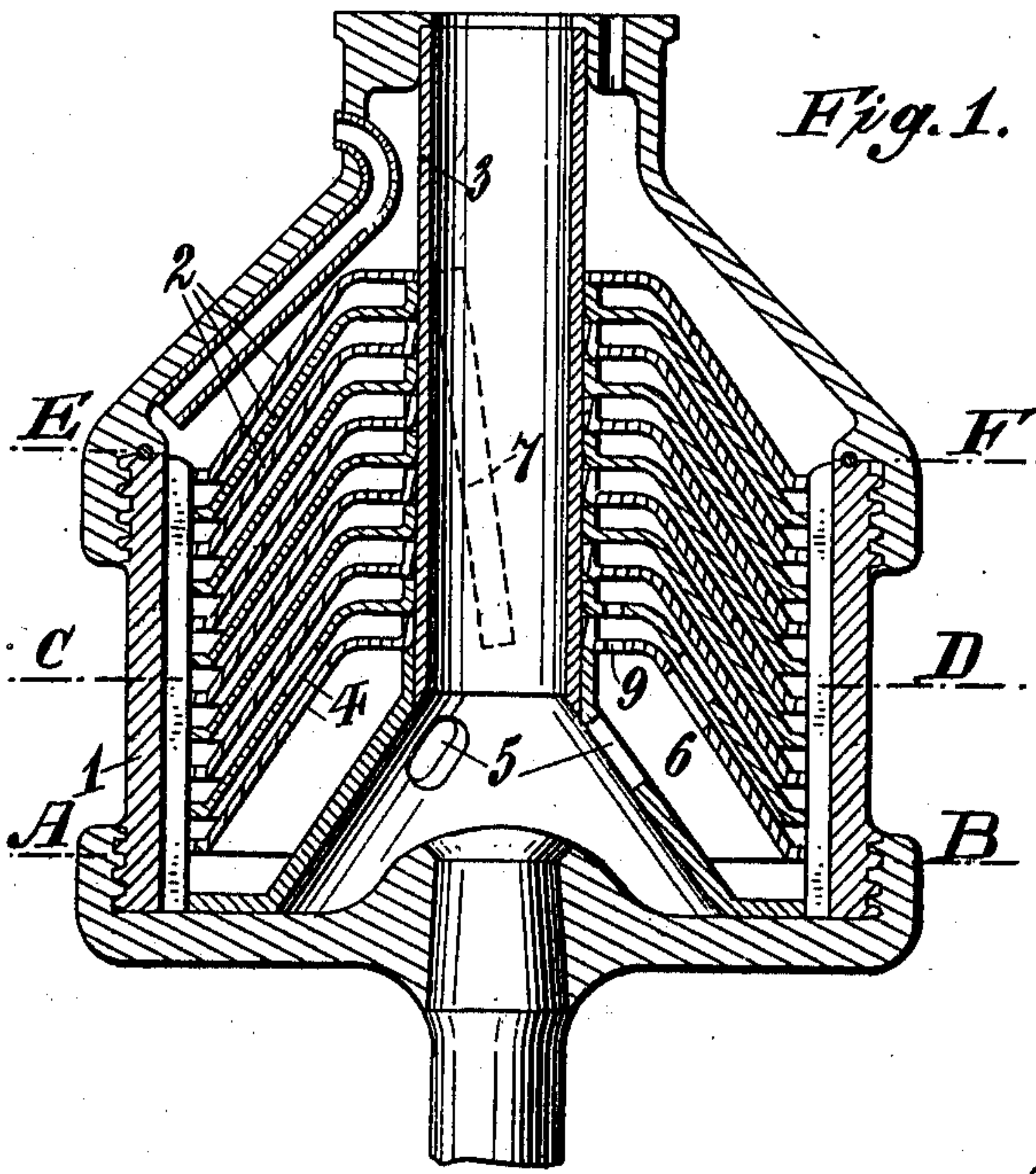


Fig. 1.

Fig. 2.

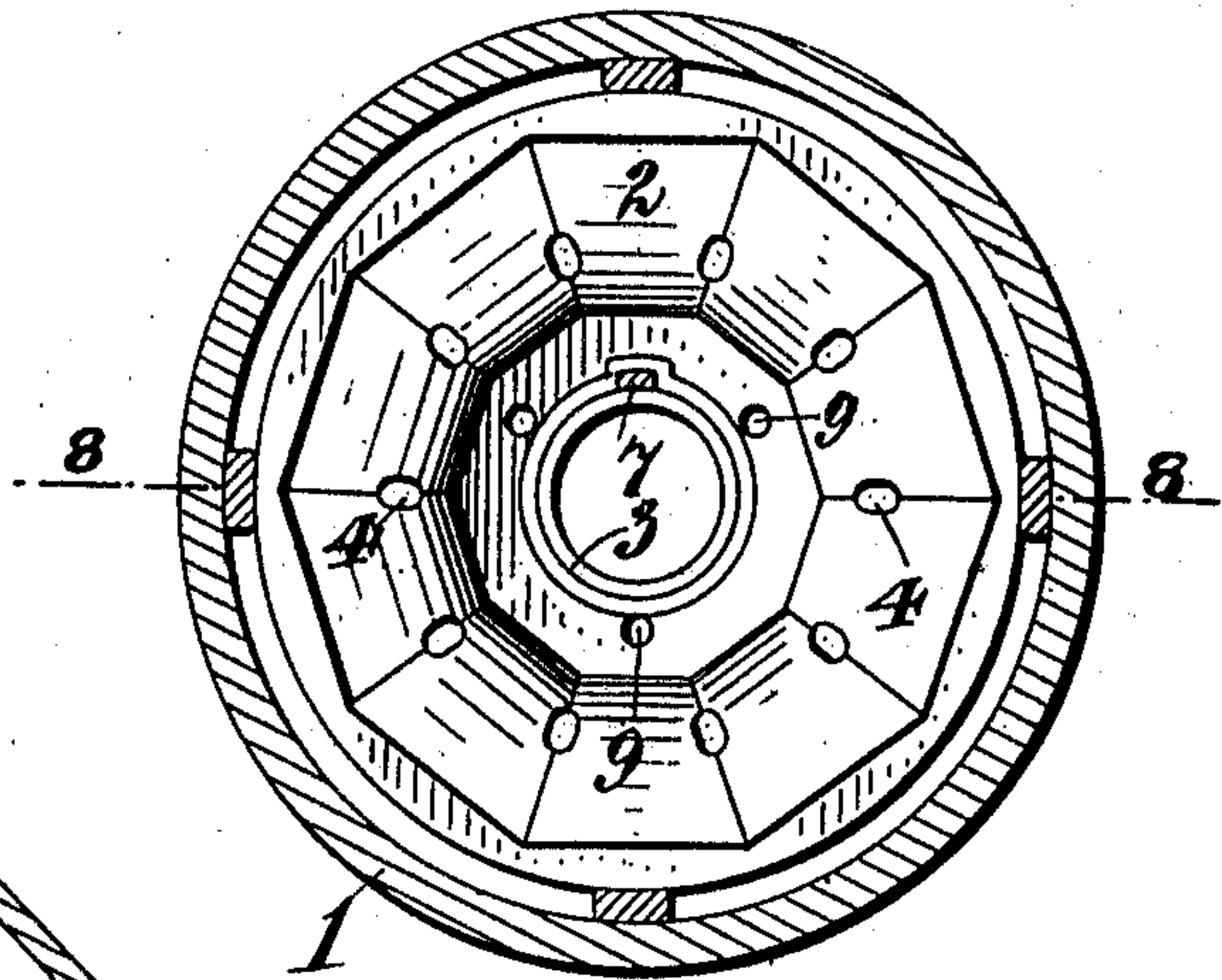
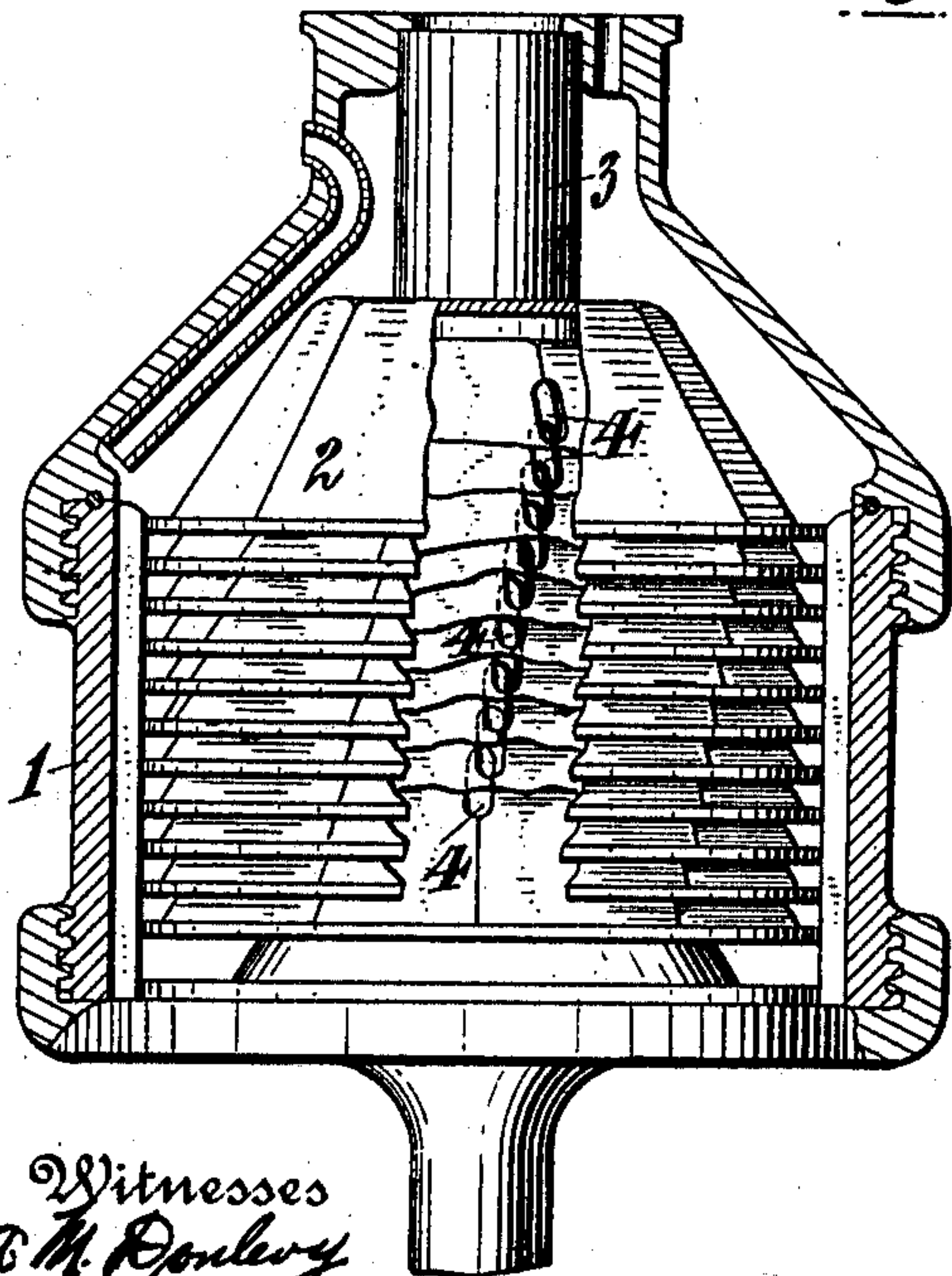


Fig. 1<sup>a</sup>.



Witnesses  
 A. M. Donlevy  
 J. C. Donlevy

Inventor  
 Olof Ohlsson  
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 Kenyon & Kenyon

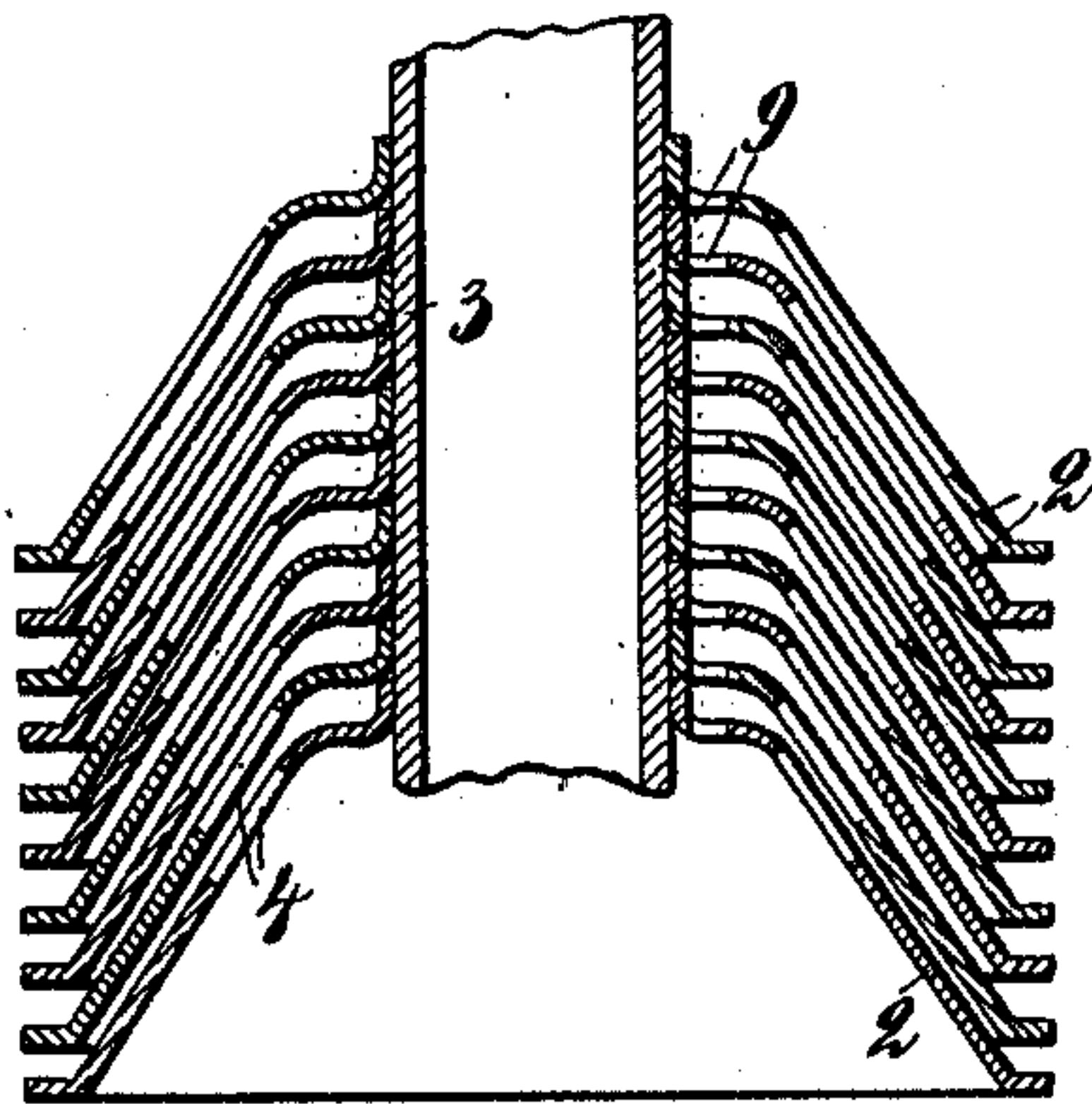
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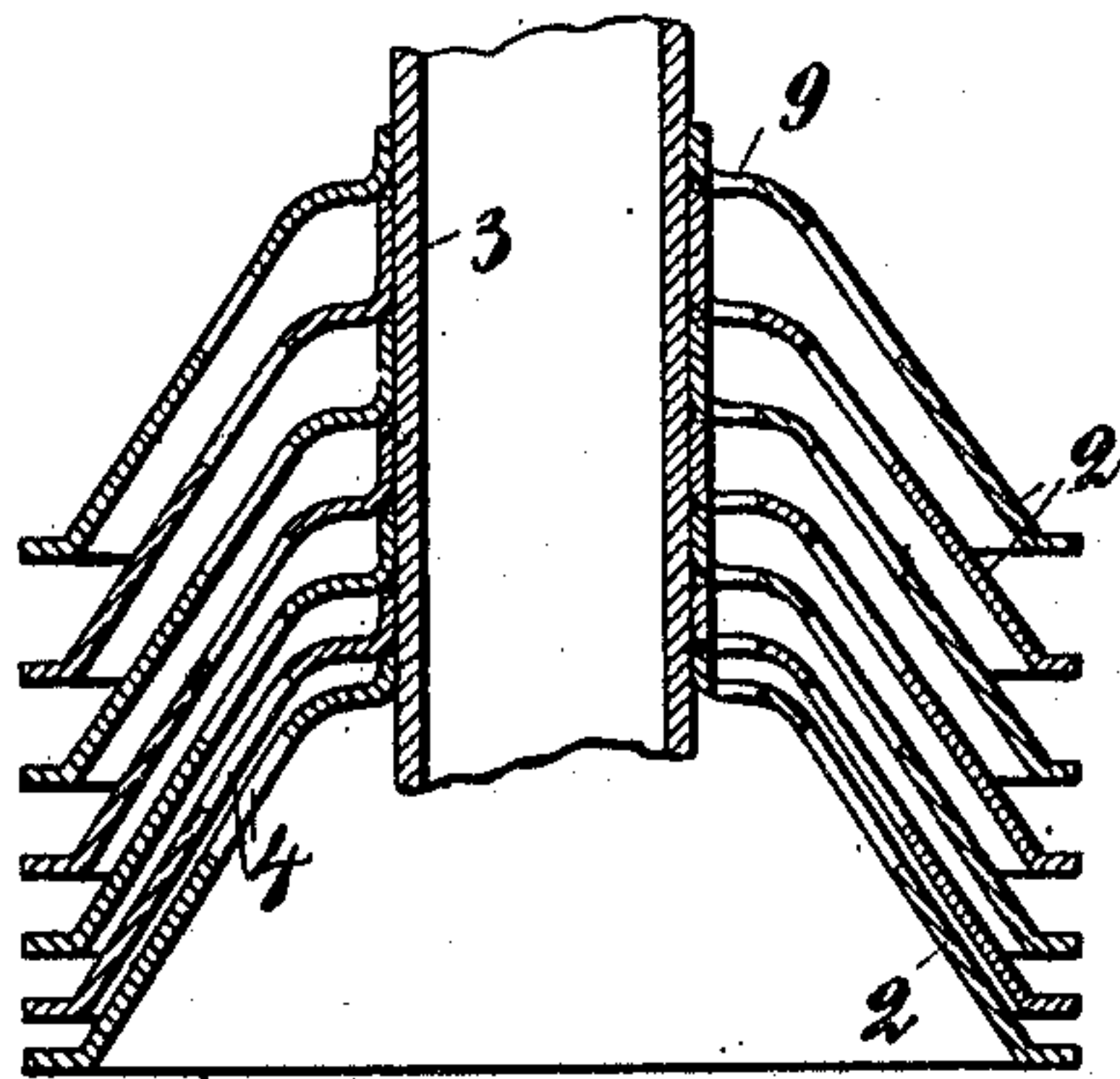
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2 SHEETS—SHEET 2.

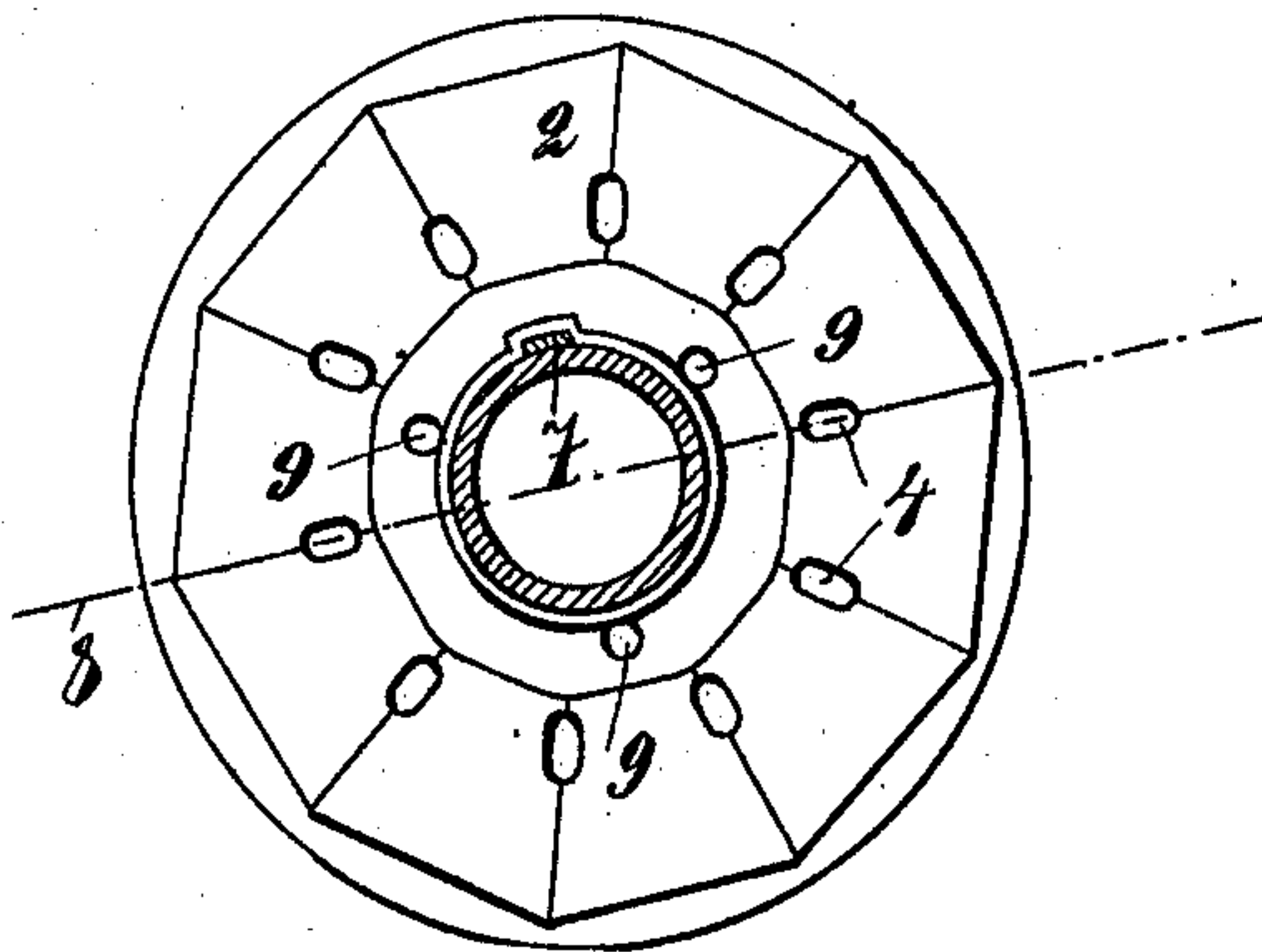
*Fig. 5*



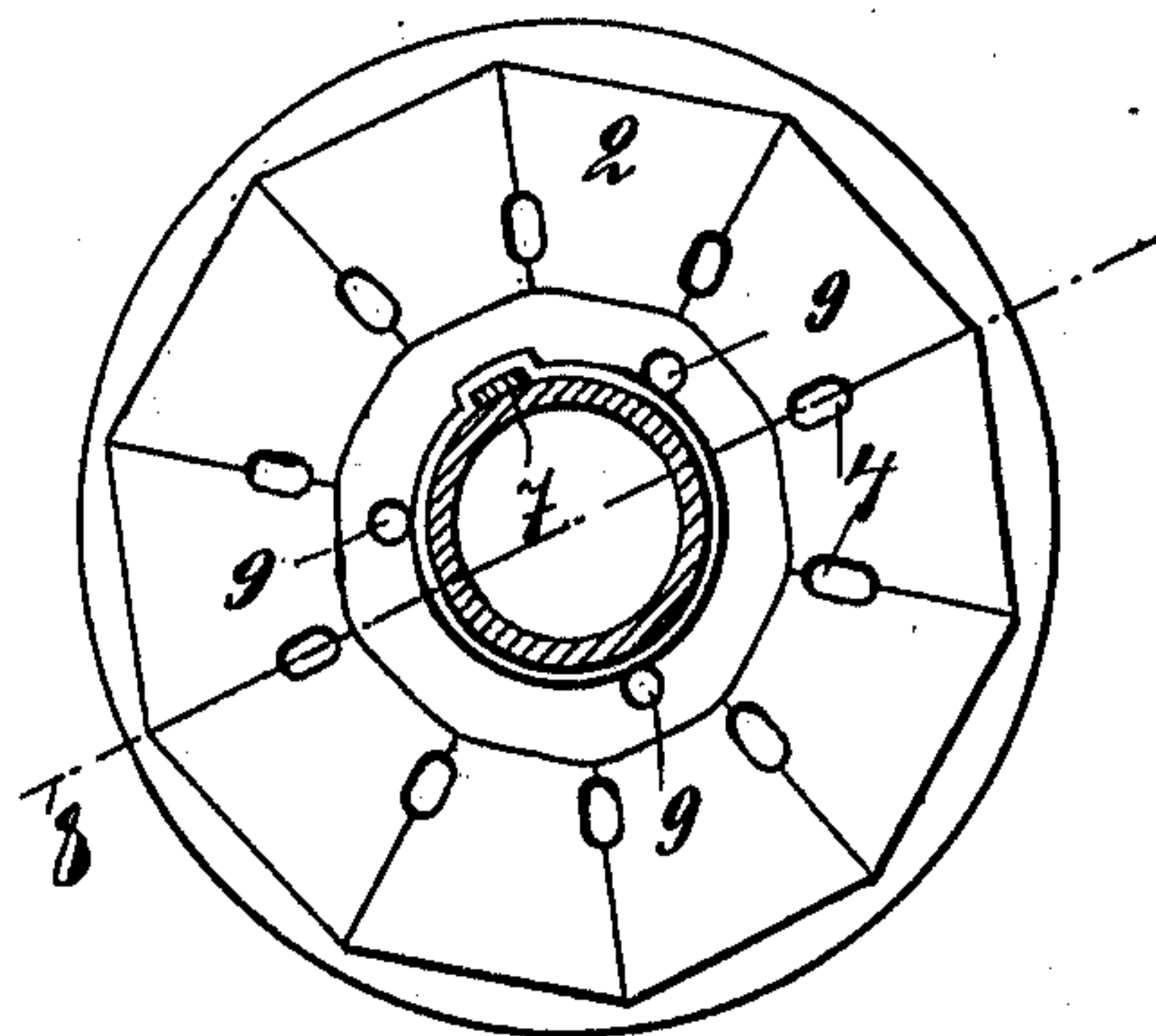
*Fig. 6.*



*Fig. 3.*



*Fig. 4.*



Witnesses.

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*Olof Ohlsson*  
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*his attys.*



# UNITED STATES PATENT OFFICE.

OLOF OHLSSON, OF SÖDERTELGE, SWEDEN, ASSIGNOR TO GUSTAF OSCAR WALLENBERG,  
OF STOCKHOLM, SWEDEN.

## LINER FOR CENTRIFUGAL LIQUID-SEPARATORS.

993,791.

Specification of Letters Patent.

Patented May 30, 1911.

Application filed August 19, 1905. Serial No. 274,838.

*To all whom it may concern:*

Be it known that I, OLOF OHLSSON, a subject of the King of Sweden, and resident of 3 Skogsgatan, Södertelge, in the Kingdom of Sweden, have invented certain new and useful Improvements in Liners for Centrifugal Liquid-Separators, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to an improvement in liners for centrifugal separating machines, and especially for cream separators, and belongs to the general class of these devices exemplified by the construction shown in my prior United States Patent Number 882,119 March 17, 1908. In this class of devices lining plates of pyramidal or conical form are placed one upon the other and properly spaced, while apertures are provided at a suitable distance from the center through which the full milk or other unseparated liquid flows upward.

This present invention is intended to provide a combination of liners of this class so arranged and constructed as to greatly facilitate movement of the liquid to be acted upon, and to thus accelerate the operation of the whole.

The invention is illustrated in a certain preferred embodiment in the accompanying drawings, wherein—

Figure 1 is a central vertical section of the drum with liners in place, Fig. 1<sup>a</sup> is a side elevation partly in section showing the spiral line of apertures in the plates. Fig. 2 is a horizontal section of the same on the plane A—B of Fig. 1, Figs. 3 and 4 are plan views of the liners seen on the lines C—D and E—F respectively, Fig. 5 is a vertical section of a modification and Fig. 6 is a vertical section of another modification of my invention.

In the drawings the drum is shown at 1 and the lining plates of pyramidal form at 2. The plates 2 are centered upon and turn with the inlet tube 3 and are pierced with apertures 4 at suitable points, preferably in the radial edges of the pyramids, where the pyramidal form is used. The liquid to be separated, entering at the top of the central tube 3, passes up through openings 5 into a

space or chamber 6 from which it is forced upward through the apertures 4.

In the form shown I provide funnel-shaped lining plates each like the other, as heretofore, but I combine these plates in a novel manner, that is to say, by turning each plate through a small angle with respect to the one below or above it. This is accomplished, in the form shown by inclining the guiding rib 7 upon which the lining plates are slid one on the other, as shown in Fig. 1. In Figs. 2, 3 and 4 the dotted line 8 indicates a corresponding diameter on plates 2 in three different positions and these figures indicate the angular displacement in this corresponding diameter by reason of the use of an inclined guide 7.

The above described construction brings the apertures 4 to form a spiral passage way, since each hole 4 is slightly advanced in a given direction and through a given angle with relation to the hole 4 below it in the same line. Consequently, instead of forcing the unseparated liquid upward through vertical passages formed by the holes 4, these passages are made inclined or spiral. Similar passages are formed for passage of the cream, or lighter liquid element by the apertures 9.

Inasmuch as a new supply of liquid is constantly passing into the drum, the inertia of the liquid causes it to hang constantly behind the whirling drums and plates, so that the drum and liquid have a movement of rotation relative to each other. This being the case, it is obvious that the rising liquid moves, with relation to the drum itself, in a spiral direction. I have found that the progress of the liquid upwardly is accelerated by making the passage through which it is destined to move conform more or less to the path which the liquid tends to take and at the same time arranging the apertures so that as more liquid tends to flow upwardly through the passageway the rate of flow thereof may be increased. It is obvious that this advantage is gained by any arrangement of apertures which causes the moving liquid moving from one aperture to the next to take the course natural to it under the influence of



the composing forces above pointed out. Thus as more liquid must be added to the passageway as it progresses upwardly the rate of flow is increased as the liquid passes upwardly. One method of facilitating this is by placing the advancing edge of each aperture a little behind that of the one placed nearer the source of flow so that each aperture in the path of flow of the liquid will have a portion thereof lying in the same vertical plane with its preceding aperture, or that the distance which one aperture is behind its preceding aperture in the path of flow is less than the distance between two adjacent apertures on the same plate. It is immaterial to this invention whether the liquid move upward or downward in the machinery, so long as the condition last described obtains.

In Fig. 5 is shown an arrangement wherein the apertures 4 are made successively wider radially thus producing passages from top to bottom the outer edges or walls of which are inclined outward. The centrifugal force is thus also utilized to accelerate movement of the liquid.

Another arrangement which can be employed combined with the first described arrangement is shown in Fig. 6 wherein the spaces between pairs of plates increases upward. This is advantageous because resistance to flow decreases with the total time during which the liquid has been in the liner. It is obvious that the direction in which this increase of space takes place is determined by the direction of flow of the liquid, whether this be upward or downward.

It is evident from the above that any one of the arrangements shown in Figs. 2, 5 and 6 may be advantageously used with any other arrangement. Or, all three arrangements may be advantageously and simultaneously used together in the same machine.

The plates may be made pyramidal or conical or partly one and partly the other (as in Fig. 2). The term "funnel-shaped" will be used to cover both forms. In all the modifications the apertures lie substantially in the path of flow which the liquid tends to take.

Having described my invention, what I claim as new and desire to secure by Letters Patent is—

1. A liner for centrifugal liquid separators consisting of plates one over the other, said plates being provided each with apertures for the passage of the liquid, and so arranged that each successive aperture through which the liquid passes is behind its preceding aperture with respect to the rotation of the liner so as to lie in the path of flow which the liquid tends to take, the

distance which one aperture is behind its preceding aperture in the path being less than the distance between two adjacent apertures on the same plate.

2. A liner for centrifugal liquid separators consisting of plates one over the other, said plates being provided each with an aperture for the passage of the liquid, and so arranged that one aperture through which the liquid passes is, with respect to the rotation of the liner, behind its preceding aperture through which the liquid passes, all of said apertures lying substantially within the path of flow which the liquid tends to take and each aperture of said path having a portion thereof lying in the same vertical plane with its preceding aperture.

3. The combination in a centrifugal liquid separator of a series of funnel-shaped plates one over the other with intervening spaces, each plate provided with apertures for the passage of the liquid, the apertures of one plate being advanced with respect to the corresponding aperture in another plate and with respect to the rotation of plates, so that the successive corresponding apertures form spiral passages for the liquid, the distance which one aperture is behind its succeeding aperture being less than the distance between two adjacent apertures on the same plate.

4. The combination in a centrifugal liquid separator of a series of funnel-shaped plates one over the other with intervening spaces, each plate provided with an aperture for the passage of the liquid, the aperture of one plate being advanced with respect to the corresponding aperture in an adjacent plate so that the successive corresponding apertures of the plates form a spiral passageway for the liquid and one aperture of said passageway having a portion thereof lying in the same vertical plane with the preceding aperture of said passageway.

5. In a centrifugal liquid separator the combination of a group of substantially similar pyramidal lining plates, each plate having apertures at similar points on the pyramidal edges, said plates being fixed one over the other, with intervening spaces, the corresponding apertures of the successive plates being arranged to form a spiral passage for the liquid, the distance which one aperture is behind its preceding aperture in the path being less than the distance between two adjacent apertures on the same plate.

6. A liner for centrifugal milk separators, consisting of a plurality of liner plates one over the other, said plates being provided each with apertures for the passage of the full milk upwardly through the same, said

apertures being so arranged with respect to one another as to lie in the path of flow which the liquid tends to take so that the rate of flow is increased, the distance which  
5 one aperture is behind its preceding aperture in the path being less than the distance between two adjacent apertures on the same plate.

In witness whereof, I have hereunto signed my name in the presence of two subscribing witnesses.

OLOF OHLSSON.

Witnesses:

ERNST SVANGVISE,  
ROBERT APELGREU.

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Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

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